AGRICULTURAL STRUCTURAL SYSTEMS II
Curriculum Content Framework

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AGRICULTURAL STRUCTURAL SYSTEMS II

Grade Levels: 10, 11, 12
Course Code: 491170

Prerequisites: Agricultural Structural Systems I

Course Description: This course is a followup to Agricultural Structural Systems I. A more in-depth look will be given to the technical areas of the agriculture structural industry, including FFA, SAE, safety, concrete & masonry, basic carpentry, plumbing, electricity, metal fabrication, and painting & finishing.

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Unit 1: Concrete and Masonry Structures
18 Hours

Terminology: Cement (masonry), Cement (Portland), Coarse aggregate, Cubic yard, Edger, Fibers, Fine aggregate, Finishing trowel, Float, Jointer, Masonry trowel, Re-bar, Reinforcement mesh

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
1.2 Identify tools used in concrete work	1.2.1 Demonstrate the correct use of the following tools: edger, jointer, float (wood, magnesium, & bull), broom, trowel (finishing & pointing)	Foundation Thinking	Reading Knowing how to Learn	Analyzes and applies what has been read to a specific task [1.3.2] Applies new knowledge and skills to concrete and masonry structures [4.3.1] Uses available resources to acquire new skills or improve skills [4.3.4]
1.3 Explain how the amount of concrete needed for a job is calculated	1.3.1 Calculate the amount of concrete needed for the structure designed in 6.5.1—or for a hypothetical structure if concrete is not needed in 6.5.1	Foundation Personal Management Thinking	Math Career Awareness, Development, and Mobility Problem Solving	Calculates/Estimates the amount of concrete needed for a specific job [1.1.8] Analyzes own knowledge, skills, and ability [3.1.2] Comprehends ideas and concepts related to concrete and masonry structures [4.4.1]
1.4 List the ingredients used in making concrete and mortar	1.4.1 Mix and pour concrete 1.4.2 Lay blocks or bricks	Foundation	Writing	Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
1.5	Discuss the use of reinforcements in concrete	1.5.1	Identify reinforcement materials –Re-bar, fiberglass, reinforcement wire mesh	Foundation	Writing	Analyzes data, summarizes results, and makes conclusions [1.6.2]
				Interpersonal	Cultural Diversity	Comprehends ideas and concepts related to concrete and masonry structures [2.2.1]
				Thinking	Problem Solving	Comprehends ideas and concepts related to concrete and masonry structures [4.4.1]
1.6	Explain how the number of concrete blocks needed for a job is calculated	1.6.1	Calculate the number of blocks needed for the structure designed in 7.5.1—or for a hypothetical structure if blocks are not needed.	Foundation	Math	Constructs geometric figures [1.1.5]
				Thinking	Problem Solving	Recognizes/Defines problem [4.4.8]
						Devises and implements a plan of action to resolve a problem [4.4.3]

Unit 2: Basic Carpentry
18 Hours

Terminology: Ceiling joist, Floor joist, Lath, Pole frame, Purlin, Rafter, Roof decking, Shingle, Siding, Truss

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.1 Define terms related to carpentry		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
2.2 Identify and read measurement devices	2.2.1 Measure dimensions with a measuring tape or rule	Foundation	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]
2.3 Identify tools used in carpentry	2.3.1 Demonstrate the use of tools used in carpentry	Thinking	Reasoning	Sees relationships between two or more ideas, objects, or situations [4.5.5]
2.4 Identify materials used in carpentry	2.4.1 Identify: lumber, fasteners, hardware, and composite materials (plywood, hardboard, particle board, etc.)	Thinking	Reasoning	Sees relationships between two or more ideas, objects, or situations [4.5.5]
2.5 Recognize methods used to build different types of framing	2.5.1 Demonstrate methods of building construction: pole framing, wall framing, floor framing, and roof framing (rafters, trusses, purlins, lathes)	Thinking	Reasoning	Sees relationships between two or more ideas, objects, or situations [4.5.5]
2.6 Recognize methods of covering roofs	2.6.1 Demonstrate methods of applying roof coverings: decking, composite, and metal	Thinking	Reasoning	Sees relationships between two or more ideas, objects, or situations [4.5.5]
2.7 Recognize methods of covering walls	2.7.1 Demonstrate methods of applying wall coverings	Thinking	Reasoning	Sees relationships between two or more ideas, objects, or situations [4.5.5]

Unit 3: Plumbing
18 Hours

Terminology: Compression fitting, Chlorinated polyvinyl chloride (CPVC), Elbow, Flaring tool, Pipe die, Pipe reamer, Polyvinyl chloride (PVC) pipe, Sanitary tee, Sweating, Union

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.1 Define terms used in plumbing		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
3.2 Discuss applications and planning of plumbing in building construction	3.2.1 Explain various applications of plumbing in agriculture construction (gas, water, air, sewage, etc.)	Foundation Thinking	Science Decision Making Knowing how to Learn	Follows safety guidelines [1.4.16] Considers risks when making a decision [4.2.3] Processes new information as related to workplace [4.3.5]
3.3 Compare plumbing materials and application (steel, copper, PVC, etc.)	3.3.1 Demonstrate the ability to select the correct type of pipe for various jobs	Thinking	Decision Making Knowing how to Learn	Generates options/alternatives [4.2.6] Uses available resources to apply new skills [4.3.6]
3.4 Identify common fittings used in plumbing	3.4.1 Demonstrate the ability to correctly use the following fittings: adapter, bushing, reducer, coupling, union, plug, and cap	Foundation	Writing	Analyzes data, summarizes results, and makes conclusions [1.6.2]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
3.5	Identify tools used in plumbing	3.5.1	Demonstrate the correct use of the following tools: vise (bench yoke and chain), wrench (pipe and chain), cutter (pipe and tubing), burr reamer, hacksaw, and triangular file	Foundation Thinking	Listening Reading Reasoning	Responds nonverbally to conversation [1.2.9] Uses appropriate materials and techniques as specified [1.3.20] Uses logic to draw conclusions from available information [4.5.6]
3.6	Discuss methods of connecting pipe and fittings	3.6.1	Measure, cut, and prepare various plumbing materials (steel, copper, PVC, etc.)	Foundation Thinking	Science Decision Making Knowing how to Learn	Follows safety guidelines [1.4.16] Considers risks when making a decision [4.2.3] Processes new information as related to workplace [4.3.5]

Unit 4: Electricity
18 Hours

Terminology: Ampere, Circuit breaker, Duplex receptacle, Fuse, Ground fault circuit interruptor (GFCI), Multipurpose tool, National electric code, Nonmetallic (NM) wire covering, Ohm, Single-pole switch, Solderless connector, Three-way switch, Underground feed (UF) wire covering, Volt, Watt

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.1 Define electricity terms		Foundation	Math	Applies addition, subtraction, multiplication, and division to real-world situations [1.1.1]
			Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]
4.2 Discuss safety practices which should always be used when working with electricity		Foundation	Science	Follows safety guidelines [1.4.16]
		Thinking	Decision Making	Considers risks when making a decision [4.2.3]
			Knowing how to Learn	Processes new information as related to workplace [4.3.5]
4.3 Identify standard electrical symbols used in drawing building plans		Foundation	Science	Constructs model to depict basic concept of standard electrical systems [1.4.12]
		Thinking	Decision Making	Generates options/alternatives [4.2.6]
			Knowing how to Learn	Uses available resources to apply new skills [4.3.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
4.4	Compare wire types and sizes	4.4.1	Select proper wire size and type for various applications	Foundation	Math	Draws to scale [1.1.20]
				Thinking	Decision Making	Generates options/alternatives [4.2.6]
					Know how to Learn	Uses available resources to apply new skills [4.3.6]
4.5	Identify electrical tools and devices	4.5.1	Select appropriate materials when given a wiring problem to complete	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
					Reading	Follows written directions [1.3.13]
4.6	Describe the methods of wiring individual electrical circuits	4.6.1	Demonstrate the correct wiring of individual electrical circuits (single pole & three-way switches, duplex & 240V receptacles, etc.)	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
					Reading	Follows written directions [1.3.13]

Unit 5: Metal Fabrication
18 Hours

Terminology: Certified welder, Galvanized metal, I-Beam, Metal gauge, Self-tapping screw, Sheet-metal roof

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.1 Define terms related to metal fabrication		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
5.2 Discuss the assembly of various types of metal structures	5.2.1 Visit a construction site where metal construction is used	Foundation	Science	Follows safety guidelines [1.4.16]
		Thinking	Decision Making	Considers risks when making a decision [4.2.3]
			Knowing how to Learn	Processes new information as related to workplace [4.3.5]
5.3 Identify materials used in metal structures		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]

Unit 6: Painting & Finishing
18 Hours

Terminology: Enamel, Lacquer, Latex, Pigment, Thinner, Vehicle

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
6.1	Define terms related to painting			Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
6.2	Compare types of paints and their uses			Foundation	Writing	Summarizes written information [1.6.17]
				Thinking	Problem Solving	Draws conclusions from what is read and gives possible solutions [4.4.4]
						Tracks and evaluates results [4.4.10]
6.3	Explain how to estimate the amount of paint needed for a given job	6.3.1	Estimate the amount of each type of paint needed for a structure designed in class	Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]
					Math	Calculates/Estimates amount of paint needed for a specific job [1.1.8]
				Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]
6.4	Outline steps in preparing surfaces to be painted			Foundation	Reading	Follows written directions [1.3.13]
				Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]
						Extracts rules or principles from written information [4.5.4]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
6.5	Discuss the use of preservatives on wood			Foundation	Listening	Comprehends ideas and concepts related to wood preservatives [1.2.1]
				Thinking	Decision Making	Generates options/alternatives [4.2.6] Identifies pros and cons to assist in decision-making process [4.2.7]
6.6	Compare methods of applying paint to wood and metal surfaces of various sizes	6.6.1	Demonstrate the ability to apply paint, using the following tools: brushes, rollers, aerosol cans, spray guns	Foundation	Writing	Analyzes data, summarizes results, and makes conclusions [1.6.2]
					Science	Applies knowledge to complete a practical task [1.4.3]
				Thinking	Problem Solving	Revises plan of action indicated by findings [4.4.9]
6.7	Explain the importance of properly cleaning painting tools	6.7.1	Demonstrate the proper methods of cleaning painting tools	Foundation	Science	Applies knowledge to complete a practical task [1.4.3]
				Thinking	Problem Solving	Recognizes/Defines problem [4.4.8]
					Reasoning	Comprehends ideas and concepts related to painting [4.5.2]

Glossary

Unit 1: Concrete and Masonry Structures

1. Cement (masonry)—a mill-mixed mortar to which sand and water must be added
2. Cement (Portland)—a mixture of various clays, chalk, limestone, river mud, slate and the like, which are mixed together, burned, ground into powder, and put through a sieve with fine meshes
3. Coarse aggregate—gravel; larger particles of stone used in concrete
4. Cubic yard—measurement of width multiplied by height multiplied by depth
5. Edger—tool used to smooth and define the work
6. Fibers—substance that adds strength to concrete
7. Fine aggregate—sand and other small particles of stone
8. Finishing trowel—tool used to smooth concrete
9. Float—a flat, broad-bladed wood or metal hand tool
10. Jointer—a tool used for smoothing or indenting the surface of a mortar joint
11. Masonry trowel—tool used to add and smooth mortar during brick laying
12. Re-bar—type of metal used to strengthen concrete slabs
13. Reinforcement mesh—type of wire material used to strengthen concrete slabs

Unit 2: Basic Carpentry

1. Ceiling joist—one of a series of parallel framing members used to support the ceiling
2. Floor joist—one of a series of parallel framing members used to support the floor
3. Lath—a building material fastened to frame of building to act as a plaster base
4. Pole frame—building supported by erect poles in the soil
5. Purlin—horizontal roof members
6. Rafter—a structural member that supports the roof
7. Roof decking—material fastened to the rafters on which the shingles or other roof covering is laid
8. Shingle—a covering applied in overlapping layers, as for the roof of a building
9. Siding—the finish covering of an outside wall of a frame building
10. Truss—an assembly of members to form a rigid framework

Unit 3: Plumbing

1. Compression fitting—couplings, elbows, tees, and unions that use a force when connecting that pushes together and squeezes a metal or rubber gasket

2. Chlorinated polyvinyl chloride (CPVC)—rigid plastic pipe used for hot and cold water supply lines

3. Elbow—a pipe fitting having two openings that allow a run of pipe to change directions at 221/2-, 30-, 45-, and 90-degree angles

4. Flaring tool—tool used to create a cone-shaped enlargement at the end of a piece of tubing to accept a flare fitting

5. Pipe die—cutting device used to thread pipe

6. Pipe reamer—a cone-shaped tool that is used to remove the burr left on the inside of metal pipe by the pipe cutter

7. Polyvinyl chloride (PVC) pipe—plastic pipe made from polyvinyl chloride that is used mainly for drain lines and is particularly resistant to chemicals

8. Sanitary tee—a fitting in a plumbing system that allows a branch line to be connected at a 90-degree angle to the main line with a sweeping curve to handle solid waste

9. Sweating—joining copper fittings and tubing using solder

10. Union—three-piece fitting that joins two sections of pipe but allows them to be disconnected without cutting the pipe; used primarily with steel pipe

Unit 4: Electricity

1. Ampere—the unit of measurement for electrical current flow that is equal to 6.24 billion electrons per second
2. Circuit breaker—an overload protection device used in distribution panels that can be reset after tripping due to overload or short circuit
3. Duplex receptacle—receptacles with two outlets; usually rated at 15 amps and wired at 115 volts
4. Fuse—an overload protection device that comes in plug, cartridge, time-lag, and non-tamperable varieties and is available in smaller sizes than circuit breakers so it can be used to protect individual equipment
5. Ground fault circuit interruptor (GFCI)—an overload-protection device required in bathrooms and other locations around water that trips instantly to prevent electrical shock
6. Multipurpose tool—an electrician's tool used for cutting wire, stripping wire, crimping terminals, and cutting small machine screws
7. National Electric Code—a commonsense set of rules for safe wiring
8. Nonmetallic (NM) wire covering—nonmetallic cable with a plastic used for interior wiring that is commonly referred to by the slang name *Romex* (actually a brand)
9. Ohm—the unit of measurement for electrical resistance
10. Single-pole switch—a switch with two terminals used to control lights or other devices from one location
11. Solderless connector—a plastic cone-shaped device used to connect wires without the need for solder
12. Three-way switch—a switch that can be identified by having three terminals and is used for controlling lights from two locations
13. Underground feeder (UF) wire covering—underground feeder cable with a rubberized covering that is approved
14. Volt—the unit of measurement for electrical pressure
15. Watt—the unit of measurement for electrical power

Unit 5: Metal Fabrication

1. Certified welder—a professional worker who has been certified by a competent, experienced welding inspector or a recognized testing facility to make certain welds under qualified procedures

2. Galvanized metal—zinc-plated for corrosion protection; achieved by hot dipping into molten zinc or by electrolysis

3. I-Beam—a steel beam with a cross section resembling the letter *I*; used for long spans such as basement beams or over-wide wall openings

4. Metal gauge—measurement according to a standard system that is used to determine the thickness of sheet metal

5. Self-tapping screw—a mechanical fastener for attaching deck, panels, or other materials to a structure, which taps its own threads

6. Sheet-metal roof—a roof covering of aluminum, copper, stainless steel, or galvanized metal sheets

Unit 6: Painting and Finishing

1. Enamel—paint with a gloss or semigloss finish
2. Lacquer—clear or colored high-gloss synthetic coating for use on metal
3. Latex—a type of paint that can be reduced and cleaned up with water
4. Pigment—a solid coloring substance suspended in a liquid or other vehicle
5. Thinner—substance used to “water down” or lessen the viscosity of something else
6. Vehicle—a device for carrying something